SONY

HD VIDEODISC RECORDER

HDL-5800

HDVS

RS-232C

PROTOCOL AND COMMAND SPECIFICATIONS

English

1st Edition

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1. GENERAL

This Protocol Manual provides instructions for controlling Sony Hi-vision Laser Video Disc Recorder HDL-5800 series by a computer.

Those using these units for the first time should read Instructions Manual of HDL-5800.

1-1. COMMUNICATION VIA THE RS-232C INTERFACE

The RS-232C is the EIA standard which defines the interface connecter for serial data transfer between a modem and a terminal device. Through this interface, data is transferred in serial format from one device to another.

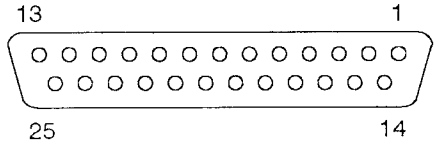
The RS-232C interface is widely used and available with most microcomputers.

1-1-1. Signal Connections

Connector pin assignments and I/O signals

The interface connector is located on the rear panel of the recorder.
Signals are listed in the table below.

RS-232C connector pin assignments



Pin No.	Signal	Description	Signal Direction
1	FG	Frame ground	——
2	TxD	Transmit data	HDL → external computer
3	RxD	Receive data	HDL ← external computer
4	RTS	Request to send	HDL → external computer
5	CTS	Clear to send	HDL ← external computer
6	DSR	Data set ready	HDL ← external computer
20	DTR	Data terminal ready	HDL → external computer
7	GND	Signal ground	——

Each signal conforms to RS-232C specifications.
(Output level ON : more than +5V, OFF : less than -5V)

Connecting Cable

The HDL-5800 has been set up so as to be used as a terminal to the external computer's serial interface. Cable requirements are determined by whether the configuration of the computer's RS-232C is for connection to a modem (DTE = Data Terminal Equipment), or to a terminal(DCE = Data Communications Equipment).
Check the RS-232C pin assignments of the external computer to be connected.

If the computer's RS-232C has been set for terminal mode (to be connected to a modem), a "null modem" cable is required, as no modem is provided in the link.
This cable is different from the standard one in that lines are wired to cross the required pins.
The cable configuration is as follows.

processor			Videodisc recorder	
FG	1		1	FG(Frame ground)
TxD	2		2	TxD(Transmit data)
RxD	3		3	RxD(Receive data)
RTS	4		4	RTS(Request to send)
CTS	5		5	CTS(Clear to send)
DSR	6		6	DSR(Data set ready)
DTR	20		20	DTR(Data terminal ready)
GND	7		7	GND(Signal ground)

If the configuration of the RS-232C on the external computer is modem mode (to be connected to a terminal), a standard cable is required.
The cable configuration is as follows.

processor			Videodisc recorder	
FG	1		1	FG(Frame ground)
TxD	2		2	TxD(Transmit data)
RxD	3		3	RxD(Receive data)
RTS	4		4	RTS(Request to send)
CTS	5		5	CTS(Clear to send)
DSR	6		6	DSR(Data set ready)
DTR	20		20	DTR(Data terminal ready)
GND	7		7	GND(Signal ground)

1-1-2. Data Format

The factory preset data format is as follows.

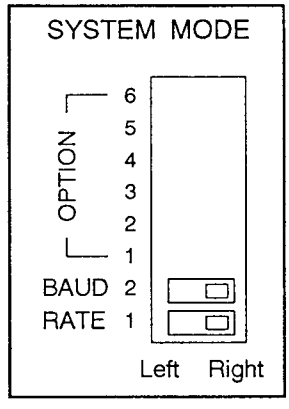
Mode	:	Asynchronous
Character length	:	8 bits
Baud rate	:	9600 bps
Parity check	:	None
Stop bit	:	1 bit
Bit order	:	Least significant bit first

To select the baud rate

The mode, character length, parity check, stop bit and bit order are fixed and cannot be changed.

Baud rate selection

Selectable baud rates are 9,600, 4,800, 2,400 and 1,200 bps. Set the BAUD RATE selector of SYSTEM MODE located on the rear panel of the recorder to match the baud rate of the external computer.
The selector information is accessed at power on sequence.
The power must be turned off and on, if the selection is changed.



Switch setting		Baud rate
1	2	
Left	Left	1,200 bps
Left	Right	2,400 bps
Right	Left	4,800 bps
Right	Right	9,600 bps

1-1-3. Communication Protocol

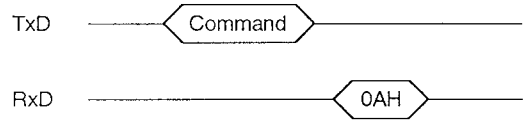
The videodisc recorder communicates with an external computer performing software handshake operations. When the videodisc recorder receives a code (in one byte) from an external computer, it sends back a handshake return code (eg. ACK, NAK or ERROR) to the computer. The computer can then transmit the next code (in one byte) to the recorder.
This is the basis of communications protocol between the recorder and computer.
The following is a description of handshake return codes.

ACK (0AH)

FUNCTION Acknowledge receipt of valid command.

DESCRIPTION ACK(0AH) (Acknowledge) is returned from the recorder when a valid command has been received and the recorder is ready to receive the next code.
The appropriate operation is executed after ACK is returned.

SAMPLE



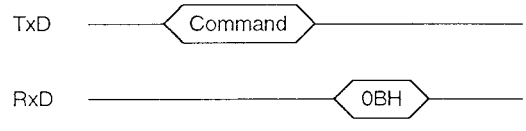
OPERATION Command contents is executed.

NAK (0BH)

FUNCTION Reject receipt of command

DESCRIPTION NAK(0BH, Not Acknowledge) is returned from the recorder when a received command cannot be accepted.

SAMPLE



ERROR (02H)

FUNCTION To notify of a communication error.

DESCRIPTION This code is returned in the event of an RS-232C communications error (parity error, framing error or overrun error).

Example of Communications protocol

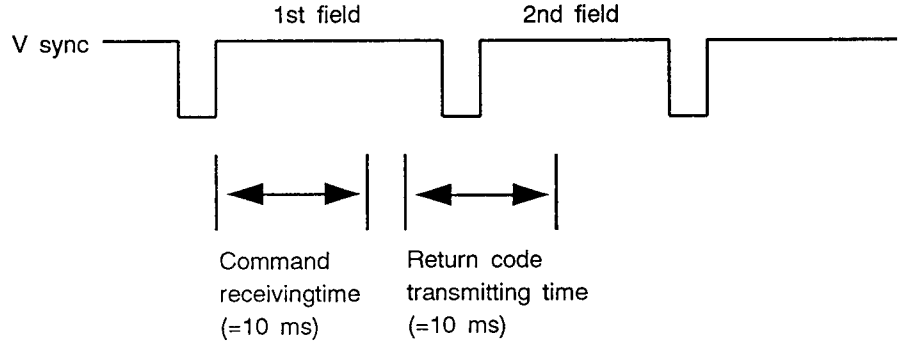
1. When inquiry codes (eg. ADDR INQ, STATUS INQ. etc.) are received by the computer, return data is sent sequencially byte by byte from the recorder to the computer, and ACK is not returned.

2. With the commands listed below, a COMPLETION code is returned when operation is completed. If a command is sent before return of the COMPLETION code, both ACK for that command and COMPLETION are returned.

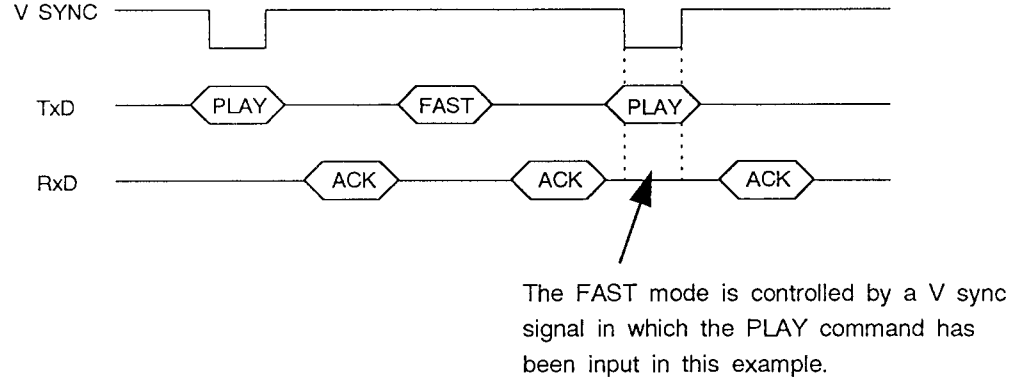
    1. SEARCH (43H)
    2. REPEAT (44H)
    3. REC STANDBY (E0H)
    4. REC (E9H)
    5. EDGE RIGHT (B9H)
    6. EDGE LEFT (BAH)
    7. BLANK AREA SEARCH (BBH)

1-1-4. Command Execution Time

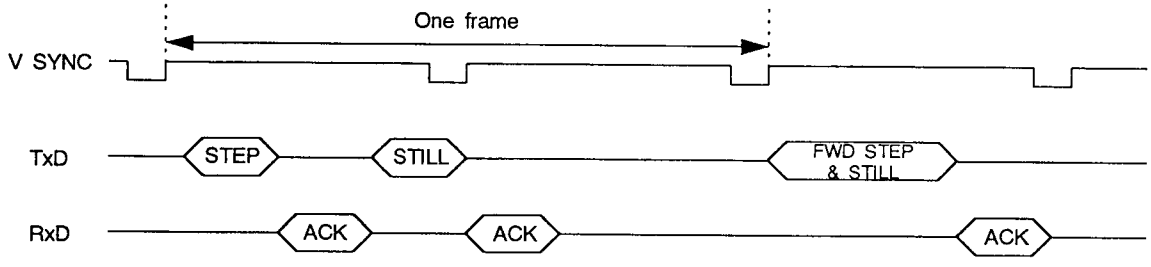
The execution time is defined as the time required for receiving a command, returning ACK if the command is valid, and entering the mode specified by the command.
This timing is not synchronized with a specific video signal.
The mode is set in sync with the return of the ACK code.
However, as operation mode switching on the recorder side is synchronized with the V sync signal, the recorder begins execution of a command within 1/30 sec (1 frame) after receiving that command. For instance, with an RS-232C baud rate of 1200 bps, when a command is sent in sync with V sync of the field, the command does not take effect until the start of the next frame (see figure below).



When the recorder receives commands in series, all the commands received may not be executed even though ACK is returned for each command transmitted.
This may be the case, for example, if the commands PLAY, FAST and PLAY are sent in series, and the second PLAY is sent before the FAST command is executed. Operations will involve PLAY and PLAY, while FAST mode will not take effect.
This is because the mode transition to FAST mode is performed in V sync, and the second PLAY command was input before the V sync for FAST mode arrived.



For the same reason, in step mode operation (advancing the still picture by one frame at a time), if the STEP and STILL (FWD STEP and STILL, or REV STEP and STILL) commands are sent in series, the desired result may not be obtained. To perform the correct operation, make sure that a set of STEP and STILL commands is sent every frame for the required times as follows.
It takes a few frames to store the playback video signal into the internal memory for CLV disc.



1-1-5. Power on Procedures

1. Connect the RS-232C interface connectors of the recorder and computer.

2. Switch ON all necessary power supplies (recorder, computer etc.).

3. Set the REMOTE/LOCAL selector located on the front panel of the recorder to REMOTE, and set the setup switch (RS-232C/9 PIN) on the rear panel of that to RS-232C.

4. Initialize the external computer RS-232C port.

5. Set DTR signal ON from the external computer.
   The recorder is set for control from the external computer (Remote mode).

6. Insert a disc in the recorder.
   The recorder will reach nominal speed within 15 seconds, and enter still mode at Frame No.0.

NOTES

- When the recorder has entered remote mode, operations from the front panel or a remote commander cannot be executed. (except for EJECT switch)
- When the external computer interface is in communication ready mode, and the recorder power is switched ON, there may be noise in the data line from the recorder. Be sure, therefore, to clear the receive buffer on the external computer side before starting data communications.

The front panel and remote commander controls are effective only when :

- The REMOTE/LOCAL selector is set to LOCAL.
- Setup switch (RS232C/9PIN) on the rear panel is set to RS-232C, and the computer control signal (RS-232C's DTR signal) is OFF.

1-1-6. Communication Line Test

RS-232C communication line tester

Use Tektronix model 834 or 834R.
These are extremely efficient programmable communications testers, and come at a reasonable price.

In case of a Tektronix tester is not available :

(1) Check that the external computer's baud rate, stop bit, character length and baud rate factor are set correctly.
(2) Check that the TxD and RxD line voltages are −8 V or below.
(3) Check that the DTR and DSR (if CTS and RTS lines are present, check these too) line voltages are +8 V or more.
(4) Send data from the computer, and check that the TxD and RxD lines are +8 V or more.

1-2. Outline of Recording

Carry out the following operations for recording.

1. Insert a WO (Write Once) disc on the recorder.
   The disc will be loaded.

2. Specify either frame number mode or time code mode.
   This is the reference mode for recording.

3. Set the recording mode.
   Set for recording 1 frame at a time, recording of continuous frames and whether to maintain the recording mode after the end of recording.

4. Preparations for recording
   It is necessary to go into recording standby mode for recording.
   If, in standby mode, a disc has just been inserted, the disc is searched for the blank areas available, and the result is registered in the recorder.
   With these preparations finished, proceed to steps(5)-(8)below.

5. Adjust the audio recording level.
   Adjust the level by turning the audio level control knob on the front panel of the processor.
   This level adjustment cannot be performed from the computer.

6. Blank area(recordable range)setting
   Although blank areas were registered during recording preparations, recordable sections may not be grouped on one location. In this case, select one particular blank area from those available.

7. Set the area for recording.
   Set the area from the start of recording to the end (IN point - OUT point) in the blank area selected.

8. Now start recording on disc.
   Recording is performed from the designated start point (IN point) to end of recording point (OUT point).
   In the case of recording 1 frame at a time, a frame is recorded from the IN point of recording each time you transmit the REC command.
   In continuous recording mode, frames are recorded at standard speed from the IN point to OUT point.

NOTES

- The recorder records video and audio data at one time. It is not possible to first record video followed by audio, or vice-versa.
  Video and audio signals must be recorded simultaneously.

- If the REMOTE/LOCAL selector on the front panel is set to REMOTE, REMOTE (RS-232C/9 PIN) switch on the rear panel of the control panel is set to RS-232C, and if the RS-232C control signal (DTR signal) is ON, control from the computer is possible.

- When the mode is reset to LOCAL from REMOTE mode (with DTR signal OFF, or the REMOTE/LOCAL selector set to LOCAL), it is no longer possible to carry out control from the computer.

  The following record system command cannot be executed normally and returns NAK, if the RO disc is inserted.
  - ASSEMBLE REC
  - BLANK AREA SEARCH
  - CONTINUE REC
  - EDGE RIGHT
  - EDGE LEFT
  - FRAME REC
  - REC
  - REC STANDBY
  - FREEZE ON
  - FREEZE OFF
  - CURRENT BLANK INQUIRE
  - NEXT BLANK INQUIRE
  - PREVIOUS BLANK INQUIRE
  - BLANK SEARCH ENABLE
  - BLANK SEARCH DISABLE

1-2-1. Preparations for Recording

Frame number mode or time code mode setting

The digits displayed on screen as the index, and the digits for search/repeat/rec area setting are treated as follows.

- Frame number mode : The frame number distinguishing frames on the disc is displayed. This is set when the FRAME # MODE (55H) command is sent.
- Time code mode : Elapsed time from the start of the disc (time code) are displayed in [Min : Sec : Frame]. This is set when the TIME CODE MODE (B8H) command is sent.

【Recording mode setting 】
There are 3 Recording modes.

• Frame recording mode
In this mode, one frame at a time is recorded from the IN point whenever the record command is input. When recording is complete up to the OUT point, recording standby mode is terminated, and the recorder goes into still mode at the last recorded frame.
This mode is set by sending the FRAME REC (E6H) command.

• Continuous recording mode
Recording is executed at standard speed from the IN point to OUT point.
When recording is complete up to the OUT point, recording standby mode is terminated, and the recorder goes into still mode for the last recorded frame.
This mode is set by sending the CONTINUE REC (E7H) command.

• Assemble recording mode
This mode is the same as the continuous recording mode up to the OUT point, but when recording is finished, the recording standby mode is maintained so that the IN point input can be set successively for the next recording area.
This mode is set by sending the ASSEMBLE REC (E8H) command.

Executing blank area search
A blank area search is executed when the BLANK AREA SEARCH (BBH) command is input. During the blank area search operation, a search is made for recordable areas over the entire, and information on the positions of these areas is registered in the recorder's memory. A blank area search operation takes approximately 15 seconds for CAV or 1 minute for CLV disc to complete.
If a blank area search operation has already been performed, it is not necessary to carry out such another search untill a different disc is loaded.

Blank Area (Recordable Range) Selection

CLV Disc :

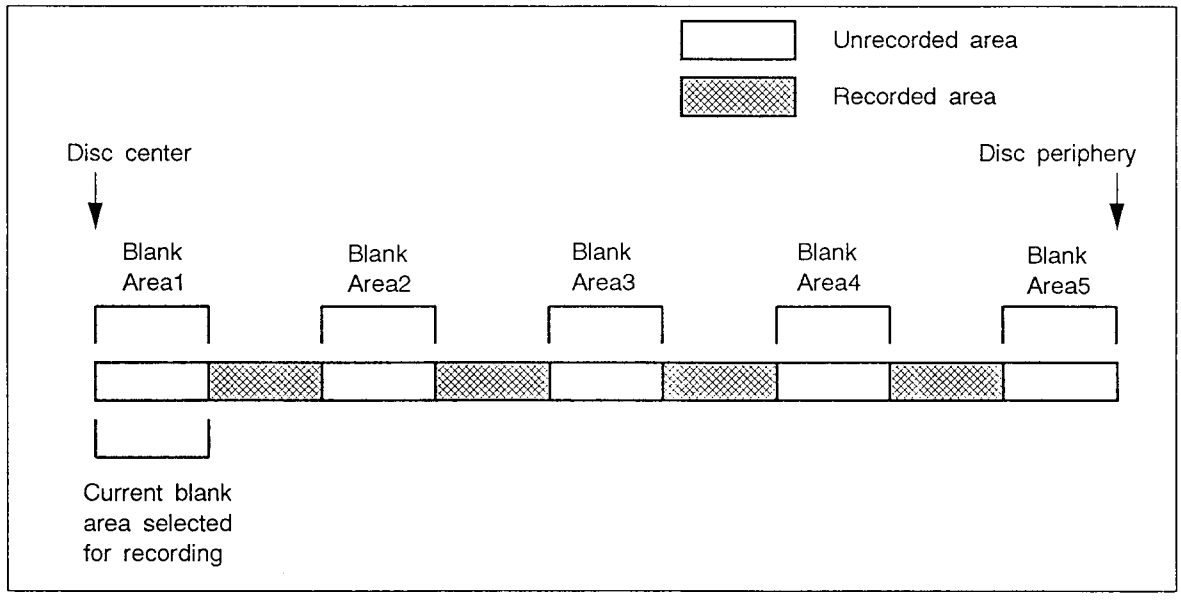
If a disc has been recorded on several times, the available blank area may not be in a single location. In this case, select one area among the blank areas available.
Recording can then be carried out only within the blank area selected. Because of this, you must select the blank area enough for the recording length, if the selected area length is shorter than the necessary length for actual recording.

Checking the range of selected blank areas

The various data registered in the processor memory are read into the computer by the following commands.

(1) CURRENT BLANK INQ(BCH) ··· Requests start and end position data for the currently selected blank area.
(2) NEXT BLANK INQ(BDH) ··· Requests start and end position data for the next blank area towards the disc periphery.
(3) PREVIOUS BLANK INQ(BEH) ··· Requests start and end position data for the next blank area towards the disc center.

Blank area example



In this case, if the selected area is "Blank Area 1" and its length is insufficient for actual recording, you must select in the other areas.

NOTES

- Neither NEXT BLANK INQ. nor PREVIOUS BLANK INQ can be executed during recording standby mode (ie. after the REC STANDBY command has been received.)

Search for start point of blank area (recordable area)

Execute a search for the start point of the blank area for recording.

CLV Disc :

The CLV disc can record from the disc center in sequence. So the blank area is always grouped on one location.

Entering the recording standby mode.

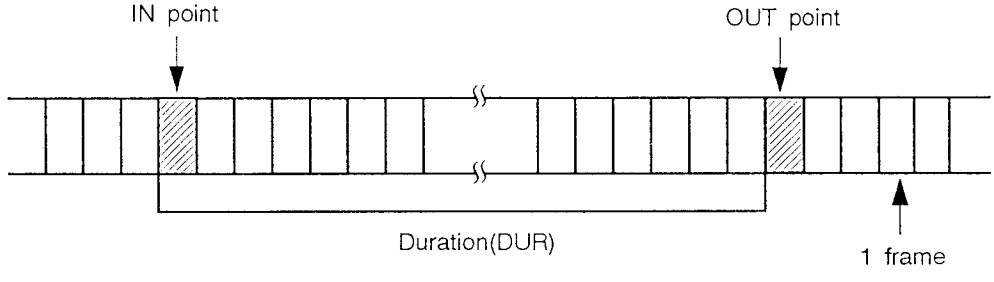
When the REC STANDBY(E0H) is received, the recorder enters the recording standby mode. If a blank area search has not already been performed, the BLANK AREA SEARCH (BBH) command is executed automatically. As there is a shift of search position, be sure to execute the BLANK AREA SEARCH command before sending the REC STANDBY command.

NOTE

- When the REC STANDBY command is received, the recorder is ready for input of the IN point data. A different blank area cannot be selected by the EDGE RIGHT or the EDGE LEFT command once the ENTER command for IN point data input has been sent.

Setting the recording area

This setting determines from which point to which point on the disc you are going to record. 3 types of data can be set ; the start-of-recording position (IN point). end-of-recording position (OUT point), and recording duration (DUR).



In frame number mode, Frame numbers and number of frames are input, while in time code mode, the time code and recording time are input.

The IN point, OUT point and DUR are set in the following order.
The recording position can be set by 2 sets of data input ; IN point and OUT point, or IN point and DUR. However, the ENTER command must be sent to determine whichever data input has been omitted (ie. OUT point or DUR).

(1) IN point input

When the recorder enters recording standby mode, it is then ready for IN point input.
Send numerical input corresponding to frame number or time code of the IN point.
In frame number mode, send a maximum 5 byte frame number, and for time code mode, a 6 byte time code.
An ACK(0AH) is returned from the recorder for every 1 byte of numerical input command received.
If the numerical input command is omitted, and ENTER (see (2) bellow) is sent, the start of the selected blank area is set as the IN point.
Only the top of the blank area can be specified as the IN point data. You must specify the top area as the IN point data, or issue the ENTER command without specifyintg the IN point data.

(2) Send the ENTER(40H) command

This command determines the IN point input data.
If the numerical input command is omitted and ENTER is sent, the start of the selected blank area is set the IN point.
For example, when the blank area starts from 00001 and ends at 09999, the IN point setting is determined as 00001.

(3) OUT point input

Send numerical input corresponding to frame number or time code of the OUT point.
In frame number mode, send a maximum 5 byte frame number, and for time code mode, a 6 byte time code.
An ACK(OAH) is return code from the recorder for every 1 byte of numerical input command received.

- When recording with only the IN point and DUR settings, numerical input is not needed, and you can proceed to step (4) below

(4) Send the ENTER(40H) command

This command determines the OUT point input data.
If the numerical input command is omitted and ENTER is sent, the end of the selected blank area is set as the OUT point.
For example, when the blank area starts from 00001 and ends at 09999, the OUT point setting is determined as 10000.

(5) Duration(DUR) input

Send the numerical input command corresponding to the duration of recording.
Send a maximum 5 byte number of frames, or a 6 bytes of time data.
An ACK(OAH) is returned from the recorder for every 1 byte of numerical input command received.

- If the IN point and OUT point have already been set, DUR may be omitted. In this case, do not input a numerical value but proceed to step (6) below.

(6) Send the ENTER(40H) command

This command determines the duration.
If the numerical input command is omitted and ENTER is sent, then [OUT point - IN point] is taken as the duration setting.
For example, when the IN point is 01000 and the OUT point is 05000, DUR becomes 04000.

Inconsistencies of IN point, OUT point and DUR data

- When all 3 sets of data have been input, if OUT point minus IN point does not equal the duration, the OUT point is reset according to final duration value sent.

- If the OUT point is set ahead of the IN point, a NAK (0BH) is returned in response to the ENTER command sent for the OUT point.

Correcting data after the IN point, OUT point and DUR have been set, and if the ENTER command is sent again, the recorder goes on standby for IN point data input. You can then reset the 3 sets of data.

1-3. Outline of Playback

With the REMOTE/LOCAL selector on the recorder's front panel set to REMOTE, REMOTE (RS-232C/9 PIN) switch on the rear panel of the control panel is set to RS-232C, and the computer control signal (RS-232C's DTR signal) is ON, control is possible from the computer.

Follow the next procedure for playback.

1. Insert a disc for playback.
   The disc is loaded, and the recorder prepares for playback.

2. When the recorder is ready for playback, it enters still mode at Frame No.0 (as Frame No.0 cannot be recorded, the picture is normally black).

3. Now send commands for the desired type of playback.
   See "COMMAND REFERENCE" for details of available commands.

NOTES

- When loading a disc, press in the direction indicated by the arrow until the disc is lightly stopped. Do not press beyond this point.
  When insertion of the disc, push the center of the disc case.

- Make sure that the label side for playback is up when inserting.

2. COMMAND REFERENCE

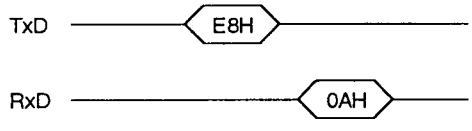
2-1. RECORDING COMMANDS

ASSEMBLE REC (E8H) - Continuous recording on a series of frames

FUNCTION — Selects the mode for continuous recording on a series of frames (assemble recording mode).

DESCRIPTION — When the recorder receives the REC command, recording is carried out at normal speed from the IN point to the OUT point.
When recording is completed up to I frame in advance of the OUT point, the recording standby mode is maintained so that the new IN point data for the next recording area can be input.
If the frame designated as the OUT point has already been recorded, the recording standby mode is terminated, and the recorder goes into still mode at the last recorded frame.

SAMPLE



NOTES — After power on, the recorder assumes that recording mode which is set by the REC MODE selector on the front panel.
Nak is returned if the RO disc is inserted.

BLANK AREA SEARCH (BBH) - Search for recordable areas of disc

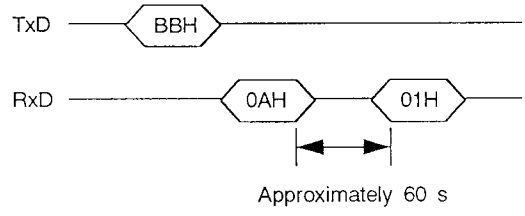
FUNCTION

Searches for blank areas of the disc.
The results are registered in the recorder's memory.

DESCRIPTION

Blank area search and registering of results in the recorder memory. When this command is executed, search takes approximately 60 seconds.
During blank area search, a BLANK AREA SEARCH BUSY FLAG (5th bit of the 2nd byte of status data) is set.
Even if a blank area search has already been executed, another search and registration will be made on receiving this command. Search times are approximately 60 seconds. When the entire area has been searched, COMPLETION (01H) is returned.

SAMPLE



NOTES

In the following cases, NAK (0BH) is returned, and the BLANK AREA SEARCH command is not accepted.

1. During recording standby.
2. When a disc has not been loaded.
3. When write operation is permitted for entire disc due to system setting (BLANK SEARCH DISABLE).
4. When the RO disc is inserted.

BLANK SEARCH ENABLE (EEH) - Overwrite recording prohibit
BLANK SEARCH DISABLE (EFH) - Entire disc recording permit

FUNCTION

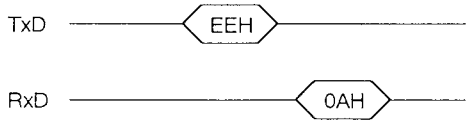
Selects the mode for either overwrite recording prohibit (BLANK SEARCH ENABLE) or recording permit for the entire disc (BLANK SEARCH DISABLE).

DESCRIPTION

When BLANK SEARCH ENABLE (EEH) is set, the BLANK AREA SEARCH command, and blank area search due to recording standby mode can be executed, and recordable areas are registered. As recording can only be performed in blank areas, the areas already recorded on are protected.
When BLANK SEARCH DISABLE (EFH) is executed, the entire disc is set as a record permit area. At this time, when the BLANK AREA SEARCH command is sent, NAK (0BH) is returned, and blank area search cannot be performed. Blank area search due to recording standby mode cannot be executed either, and any area can be set as the recording area. Record protect for areas already recorded on is not effective.

SAMPLE

Overwrite recording protect (BLANK SEARCH ENABLE) :



NOTES

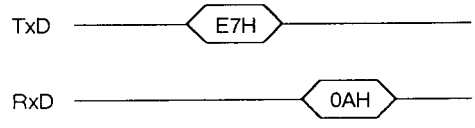
- When the recorder is in BLANK SEARCH DISABLE mode, overwrite protect is not effective.
- The recorder assumes overwrite inhibit mode immediately after power on.
- Nak is returned if the RO disc is inserted.

CONTINUE REC (E7H) - Recording on a series of frames

FUNCTION — Sets the mode for recording a series of frames (continuous recording mode)

DESCRIPTION — When the recorder receives the REC command, recording is performed at normal speed from the IN point to OUT point.
When recording is complete up to 1 frame in advance of the OUT point, recording standby mode is terminated, and the recorder goes into still mode at the last recorded frame.

SAMPLE



NOTES — Just after power ON, the recorder assumes the recording mode set by the REC MODE selector on the front panel.
Nak is returned if the RO disc is inserted.

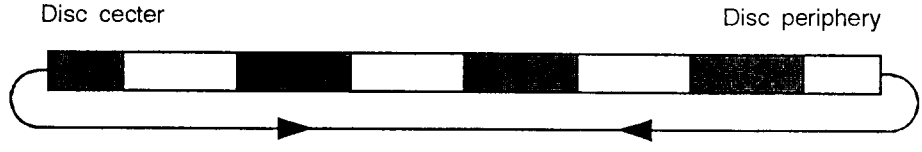
EDGE RIGHT (B9H) - Select blank area in direction of disc periphery
EDGE LEFT (BAH) - Select blank area in direction of disc center

FUNCTION Selection of 1 among the blank areas allocated.

DESCRIPTION Sets a separate blank area from the one set in recording standby either in the direction of the disc periphery or disc center.

- EDGE RIGHT (B9H) command
  Search and select the first available blank area towards the disc periphery from the one currently set.
- EDGE LEFT (BAH) command
  Searches and selects the first available blank area towards the disc center from the one currently set.

If no more blank areas are present in either direction from the one selected, the following loop operation is executed when the EDGE RIGHT or EDGE LEFT command is sent.



When the EDGE LEFT command is sent again, the first blank area from the disc periphery is selected.

When the EDGE LEFT command is sent again, the first blank area from the disc center is selected.

These commands are effective untill ENTER (40H) is sent for the IN point input in recording standby mode .

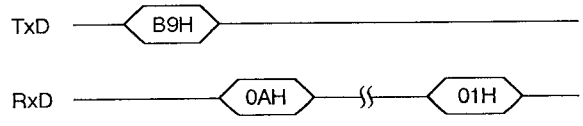
Reselection of blank area after sending the IN point data.

If the blank area is reselected after IN point data is sent and before sending the ENTER command, the IN point is temporarily set at the start position of the new blank area.
If necessary, send the revised IN point data.

Reselection of the blank area after sending the ENTER command for the IN point. Send the C.L. command. This cancels the recording standby mode. Select the blank area after sending the REC STANDBY command once again.

SAMPLE

Blank area search towards disc periphery :



NOTES

In the following instances, NAK (0BH) is returned, and the EDGE RIGHT or EDGE LEFT command is not accepted.

1. When the entire disc is write - permitted due to system setting (BLANK SEARCH DISABLE).
2. After ENTER (40H) is sent for the IN point in recording standby mode.
3. When the RO disc is inserted.

FRAME REC (E6H) - Recording one frame at a time

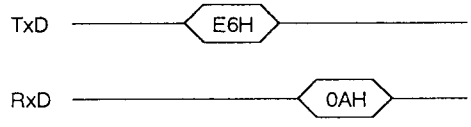
FUNCTION

Sets the mode for recording 1 frame at a time (frame recording mode).

DESCRIPTION

When the recorder receives the REC command, 1 frame only is recorded from the set IN point, after which the IN point is incremented by 1.
When recording has been executed up to 1 frame in advance of the OUT point, STANDBY mode is terminated, and the recorder enters still mode at the last recorded frame.

SAMPLE



NOTES

Just after power ON, the recorder assumes the recording mode set by the REC MODE selector on the front panel.
Nak is returned if RO disc is inserted.

REC (E9H) - Execution of recording

FUNCTION

Executes recording in the recording mode set, from the specified IN point to OUT point.

DESCRIPTION

When this command is sent after setting the IN point, OUT point, and duration in recording standby mode, recording is executed on the selected recording mode.

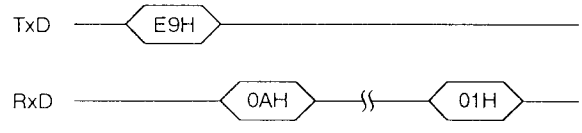
(1) Frame recording mode
One frame only is recorded from the set IN point, after which the IN point is incremented by 1.
When recording has been executed up to one frame in advance of the OUT point, recording standby mode is terminated, and the recorder enters still mode at the last recorded frame.

(2) Continuous recording mode
Recording is performed at normal speed from the IN point to OUT point.
When recording is completed up to one frame in advance of the OUT point, recording standby mode is terminated, and the recorder goes into still mode at the last recorded frame.

(3) Assemble recording mode
Recording is performed at normal speed from the IN point to the OUT point.
When recording is completed up to one frame in advance of the OUT point, the recording standby mode is maintained so that the IN point for the next recording can be specified. If the OUT point frame has been recorded already, the recording standby mode is terminated, and the recorder goes into still mode at the last recorded frame.

The REC BUSY STATUS flag is set during recording.
See STATUS INQ. (67H) command for status readout.
A COMPLETION (01H) is returned when recording has ended. If an error has occurred during recording, NOT TARGET (05H) is returned.

SAMPLE



ABORT

Send the C.L. (56H) command

When the C.L. command is received, recording is aborted, and recording standby is terminated. Abort cannot be effected, however, during recording of a frame. During frame recording mode, therefore, recording is aborted after recording of one frame.

Operations with respect to control commands cannot be guaranteed immediately following clear until the SPINDLE UNLOCK flag (7th bit of the 2nd byte of status data) is reset.

Recording mode can be restarted by performing all recording operations from the REC STANDBY command.

NOTES

- Recording is not executed on the frame specified for the OUT point.
- In the following cases the REC command is not accepted, and NAK (0BH) is returned.

1. When the recorder is not in recording standby mode (ie. the REC STANDBY command has not been executed).
2. When the recording mode has not been set, and when the recording mode selector on the front panel is in the REC INHIBIT position. (The recorder assumes the recording mode set by the REC MODE selector on the front panel immediately after power ON).
3. When signals for recording are not input.
4. When RO disc is inserted.

- Recording is aborted in the following circumstances, and NOT TARGET (05H) is returned.

1. If video input ceases, or there is a disturbance to it.
2. If the recorder receives a shock.
3. If the disc is badly flawed or dirty.

REC STANDBY (E0H) - Recording standby

FUNCTION Prepares for recording and sets the recorder to recording standby mode.

DESCRIPTION The necessary conditions for recording can be set with this command.

【Blank area search】

IN the blank area search enable mode, after inserting a disc and execution of REC STANDBY command, blank area search is carried out automatically.

Blank area search takes approximately 15 seconds for CAV disc and 1 minute for CLV disc to complete, after which the frame prior to the IN point of the innermost blank area is searched, and COMPLETION (01H) is returned.

If blank area search has already been carried out, and a blank area is present, the frame prior to the IN point of the nearest blank area is searched, and COMPLETION (01H) is returned.

If there is no blank area, NO FRAME NUMBER (06H) is returned, and the recorder does not enter recording standby mode.

【Command parameters】

After sending the REC STANDBY command, it is necessary to set the 3 parameters which determine the recording duration (IN point, OUT point and duration).

See "1-3. Outline of recording" for details.

【Permissible commands in recording standby mode】

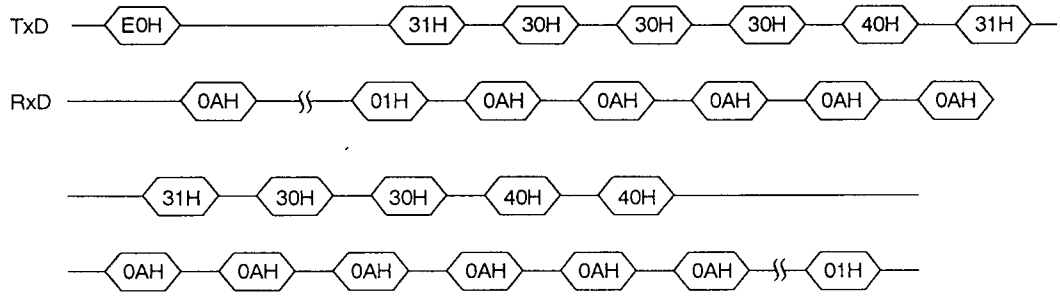
The commands listed below can be executed in recording standby mode.

Timing	Commands which can be executed at this time
During IN point input (before sending the ENTER (40H) command for the IN point input)	1. EDGE RIGHT (B9H) 2. EDGE LEFT (BAH) 3. All inquiry commands except NEXT BLANK INQ & PREVIOUS BLANK INQ 4. C.L. (56H) 5. C.E. (41H) 6. Numerical input commands 0~9 (30H~39H) 7. ENTER (40H) 8. Recording mode setting command
During OUT point input During DUR input (after the ENTER (40H) command has been sent for the IN point input)	1. C.L. (56H) 2. C.E. (41H) 3. Numerical input commands 0~9 (30H~39H) 4. ENTER (40H) 5. Recording mode setting command

Timing	Commands which can be executed at this time
After setting all of the IN point, OUT point, DUR	1. REC (E9H) 2. C.E. (56H) 3. ENTER (40H) 4. Recording mode setting command

SAMPLE

When the IN point is 1000, and the OUT point is 1100 (as DUR is determined by OUT point minus IN point, you need only send the ENTER command)



ABORT

Send the C.L. (56H) command

NOTES

- Recording cannot be carried out without executing the REC STANDBY command. If a REC command is sent without first sending the REC STANDBY command, NAK (0BH) is returned, and recording cannot be conducted.
- With blank search disable status, the entire disc is set as the blank area (recordable area). At this time, blank area search is not executed.
- If the disc cartridge's tab is in the write inhibit position, NAK (0BH) is returned, and the recorder does not enter the recording standby mode.
- When the IN point, OUT point and duration setting is completed, a search operation is performed for the frame preceding the IN point. After completion of the search operation, if pickup position shifts to another frame, the recording standby mode is canceled.
- Nak is returned if the RO disc is inserted.

FREEZE ON (DDH, 90H) - Freeze incoming video signal
FREEZE OFF (DDH, 91H) - Unfreeze incoming video signal

FUNCTION

Freeze or unfreezes the incoming video signal in the frame recording mode.

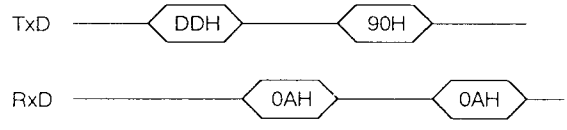
DESCRIPTION

When the recorder receives the FREEZE ON command, it grabs the incoming video signal into memory and outputs a frozen image. If the REC command is received, this frozen image is recorded.
When the recorder receives the FREEZ OFF command, it unfreeze the image. This command is effective only when the recorder is in both the frame recording mode and the recording standby mode. It is not effective if received in the continuous recording mode, the assemble recording mode, or the playback mode.

The FREEZE OFF command unfreezes the image. The image is also automatically unfrozen when the recording standby mode ends, or when the frame recording mode is canceled.

SAMPLE

To freeze the incoming video signal in the frame recording mode.



NOTES

Always send this command to the recorder after first sending DDH.
The recorder does not recognize either 90H or 91H by itself.
Nak is returned if RO disc is inserted.

Numerical input commands 0-9 (30H - 39H)

FUNCTION Inputs numerical data.

DESCRIPTION 30H - 39H expresses the numerical data used to specify parameters in the following cases. ENTER (40H) is required after numerical data input.

1. SEARCH	:	Frame No.input
		Time code input.
2. REPEAT	:	Frame No.input
		Time code input.
		Repeat time inputs.
3. STEP	:	Step rate input.
4. MARK SET	:	Frame No.input
		Time code input.
5. REC STANDBY	:	IN point input
		OUT point input
		DUR input

C.E. (41H) - Clear input

FUNCTION Clears numerical data input

DESCRIPTION Effective only when numerical data has been input.
When this command is sent, numerical data input is erased from the last digit.

ENTER (40H) - End of parameter input

FUNCTION Determines numerical data

DESCRIPTION Used as the end mark for the following command parameters

1. SEARCH
2. REPEAT
3. STEP
4. MARK SET
5. REC STANDBY

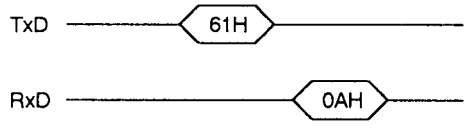
When the recorder receives the ENTER command (2 or more may be sent depending on the command for execution), the commands listed above are executed.

CONTINUE (61H) - Resume mode prior to STILL command

FUNCTION Returns the recorder to the mode it was in prior to the STILL command

DESCRIPTION Returns the recorder to the mode it was in before the STILL command was received. If the command is input with no STILL command transmitted beforehand, NAK (0BH) is returned.

SAMPLE



NOTES

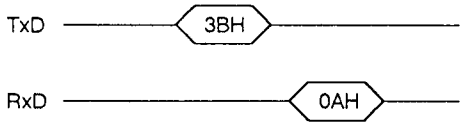
- If commands are input in the order STILL, STILL, PLAY, CONTINUE, the recorder will enter the STILL mode. This is the command before the second STILL command was input (ie. STILL).
- A search operation interrupted by STILL cannot be resumed by the CONTINUE command. The recorder remains in the STILL mode at that point, and returns NAK (0BH).
- A repeat operation interrupted by STILL cannot be resumed by CONTINUE.

F-FAST (3BH) - Fast forward play (3 times the normal speed)
F-FAST (4BH) - Fast reverse play (3 times the normal speed)

FUNCTION — Sets the recorder in fast forward or fast reverse playback mode on the CAV disc (3 times the normal speed).

DESCRIPTION — When these commands are input, the recorder plays back the recorded data on the disc at three times the normal speed (in the forward or reverse direction respectively).

SAMPLE — To play at fast speed in the forward direction :



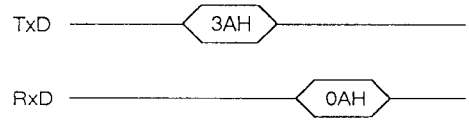
NOTES — These command are not executed and NAK is returned when the CLV disc is inserted.

F - PLAY (3AH) - Normal forward play
R - PLAY (4AH) - Normal reverse play

FUNCTION Sets the recorder in normal playback mode on the CAV disc (forward or reverse).

DESCRIPTION When these commands are input, the recorder plays back the recorded data on the disc at the normal speed (in the forward or reverse direction respectively).

SAMPLE To play back at normal speed in the forward direction :



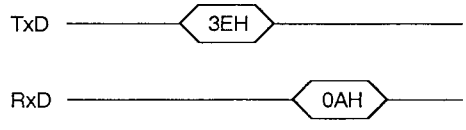
NOTES R-PLAY is not executed and NAK is returned when the CLV disc is inserted.

F - SCAN (3EH) - Scan in forward direction
F - SCAN (4EH) - Scan in reverse direction

FUNCTION Sets the recorder in scan playback mode in the forward or reverse direction.

DESCRIPTION When these commands are input, the recorder plays back the recorded data on the disc at approximately 30 times normal speed (forward and reverse directions respectively).

SAMPLE To scan the picture in the forward direction :

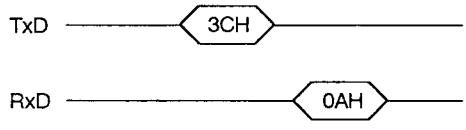


F - SLOW (3CH) - Slow forward play
F - SLOW (4CH) - Slow reverse play

FUNCTION Plays back on the CAV disc at slow speed in the forward and reverse direction

DESCRIPTION When these commands are input, the recorder plays back the recorded data on the disc at 1/5 times normal speed. F-SLOW is for slow motion play in the forward direction, and R-SLOW is for reverse.

SAMPLE To play at slow speed in the forward direction ;



NOTES This command is not executed and returns NAK when the CLV disc is inserted.

F - STEP (3DH) - Step forward play
F - STEP (4DH) - Step reverse play

FUNCTION Plays back step by step in the forward and reverse directions on the CAV disc.

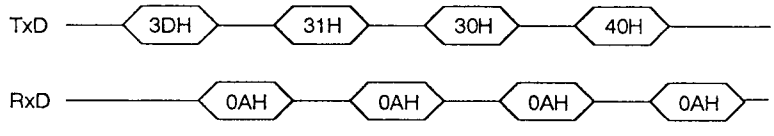
DESCRIPTION When these commands are input, the recorder plays back the recorded data on the disc at variable speed. F- STEP is for forward playback, and R-STEP is for reverse playback. The range of speeds available is 1/1 - 1/255 times normal speed. A parameter specifying the step speed can be added for the STEP command, and this parameter is a denominator. The range is 1 - 255, and this is specified by numerical input. The parameter is then followed by the ENTER (40H) command. If this parameter is omitted, the step speed is set to 1/7.
If you want the disc to advance by 1 frame only, input the F-STEP command followed by the STILL command.
Alternatively, if you want to return by 1 frame, input the R-STEP command followed by the STILL command. To advance (or reverse) the videodisc by "n" frames, send these command combinations "n" times.
For details see "1-1. Communication via the RS-232C interface, 1-1-4. Command execution time"

Seconds of display per frame for various step speeds

1/1*	0.033	1/120	4.0
1/2	0.066	1/150	5.0
1/3	0.1	1/180	6.0
1/10	0.33	1/210	7.0
1/30	1.0	1/240	8.0
1/60	2.0	1/255	8.5
1/90	3.0		

* Same speed as normal PLAY but audio output is muted.

SAMPLE To play at 1/10 time normal speed in the forward direction.



NOTES
- If "0" is selected as the denominator, the resuit is the same as STILL, but FWD STEP or REV STEP is displayed when the index funtion is activated.
- The function cannot use for CLV disc.
  Each command works as follows ;
  F-STEP : FWD-STEP & STILL
  R-STEP : REV-STEP & STILL

FWD-STEP AND STILL (2BH) - One frame advance and still
REV-STEP AND STILL (2CH) - One frame reverse and still

FUNCTION Advances (or reverses) the disc by 1 frame and freezes the picture.

DESCRIPTION When FWD-STEP AND STILL is sent, the still picture is advanced by 1 frame, after which still play is resumed. If the recorder is not in still mode when this command is input, the next frame to that played at the time the command is received is played back in still mode.

When REV STEP AND STILL is sent, the still picture is reversed by 1 frame, after which still is resumed. If the recorder is not in still mode when this command is input, the frame prior to the frame played when the command was input is played back in still mode.

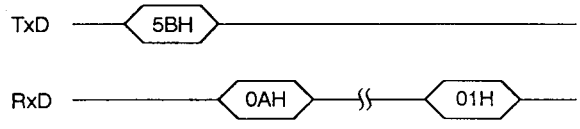
SAMPLE To advance the picture by frame and set to still mode :

M - SEARCH (5BH) - Locate the memorized address

FUNCTION Locates the memorized location and sets the recorder in still mode.

DESCRIPTION When this command is input, the location set in memory with the MEMORY command is searched, and the picture at that location is played back in still mode.

SAMPLE



MARK SET (73H) - Set the mark position

FUNCTION

Marks the specified frame (time).

DESCRIPTION

When this command is sent, the specified position is marked. When the marked position is reached, the recorder outputs the MARK RETURN code (07H).
In frame number mode, the frame number is marked, and in time code mode, the time code is marked.
If the C.L. (56H) is received before passing the marked position, the mark position is reset, and the MARK RETURN code is not returned.

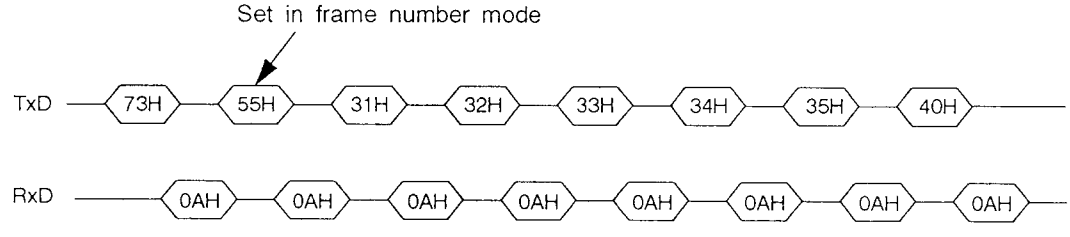
PROCEDURE

Specify the mark data with a numerical input command.
The number of effective digits before ENTER (40H) is input are as follows.

Frame : Last 5 digits
Time code : Last 6 digits

SAMPLE

To mark Frame No. 12345 :



NOTES

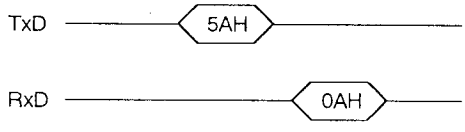
After a mark has been set, the mode at the time of marking remains effective, even if the frame number mode or time code mode are changed.
For example, if frame No. 12000 is specified in frame number mode, and then you change the mode to time code mode, frame No. 12000 remains effective.

MEMORY (5AH) - Memorize the current location

FUNCTION — To memorize either the frame number or time code of the location currently in play.

DESCRIPTION — When the recorder receives this command, the frame number or time code of the location in play is stored in memory.
This location is searched by the M-SEARCH (5BH) command.

SAMPLE



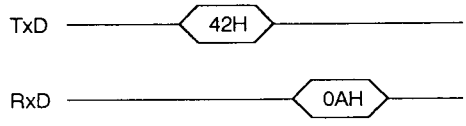
NOTES — The memorized location cannot be erased untill either the disc is ejected or the memory is revised.

MENU (42H) - Find start of disc picture area

FUNCTION — Plays back from the first picture on the disc.

DESCRIPTION — The recorder begins playback from the first recorded frame in the picture area of the disc.

SAMPLE



NOTES — NAK (0BH) is returned if this command is received during input of the SEARCH, REPEAT, MARK SET, STEP, or REC STANDBY command.

REPEAT (44H) - Repeat play a designated sequence

FUNCTION

Repeats play between 2 designated points on the disc.

DESCRIPTION

This command allows repeated play at a designated playback speed and designated number of times between 2 points specified in either frame No. or time code.
The start-of-play position is the position received when this command is input. Accordingly, this position should be searched before repeat play.
If the end location is in advance of the start position, repeat play is performed in the reverse direction.
The number of repeat plays can be set from 0 - 99. If this number is not specified, the repeat number is taken as 1, and repeat play is carried out once only.
If the repeat number is "0", repeat play continues until input of the C.L. (56H) command.

The repeat command requires 2 parameters. One is the target end location, and the other is the number of times the sequence should be repeated.
Both parameters are specified by numerical input, and the ENTER (40H) command must be sent after each.

To set the desired mode
If the recorder is not in the mode in which the repeat operation is to be performed, the command for the desired mode should be sent before the REPEAT command.

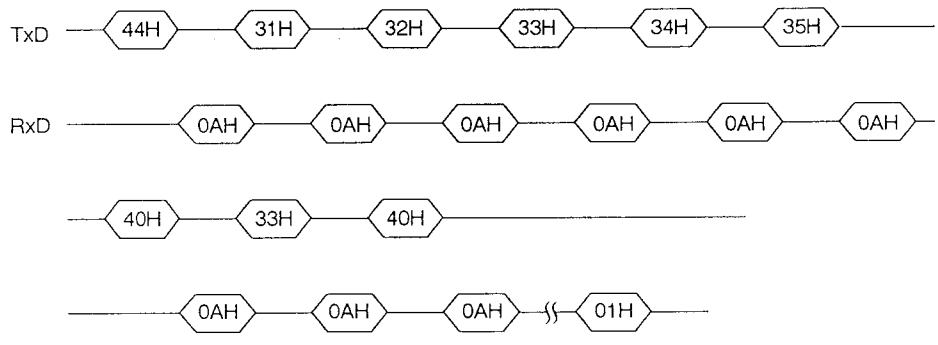
Frame number mode : 55H
Time code mode : B8H

PROCEDURE

1. Search for start of repeat : SEARCH (43H) location
2. Specify the start location : Numerical input commands (30H - 39H)
3. Send the ENTER : ENTER (40H) command
4. Wait for COMPLETION (01H) to return
5. Send the REPEAT : REPEAT (44H) commad
6. Set the end location : Numerical input commands(30H - 39H)
7. Select the playback specified, playback is conducted at normal : F-FAST (3BH), F-PLAY mode (when not (3AH), F-SLOW (3CH), F-STEP (3DH)
8. Specify the number of repeat plays : Numerical input commands (30H - 39H)

9. In any play mode other than step play, repeat play starts from now. However, when in step play mode, the following operations are required. : ENTER (40H)
10. Specify the step speed : Numerical input commands (30H - 39H)
11. Send the ENTER command : ENTER (40H)

SAMPLE Repeat 3 times the current frame to Frame No.12345.



NOTES

● To set the play mode for repeat

Unless otherwise specified, playback is performed at normal speed (in the forward or reverse direction depending on whether the end point is set behind or in front of the start position). When you want another playback mode, send the appropriate command for playback speed in the forward direction (F-FAST, F- STEP, etc) before inputting the ENTER command which determines the repeat end point. The direction of play is determined by the end location (ie. behind or in front of the start location). The ENTER command should be sent directly after the playback speed command.

When specifying step playback, select the step speed from 1/1 - 1/255.

The step speed should be specified after the number of repeats. For details see "F-STEP (3DH), R-STEP (4DH)".

If the step speed is not specified, the recorder assumes the still mode.

- To stop operation before all repetitions are completed
  Send the C.L. (56H) command. The repeat mode is cleared, and any other command can then be accepted. The recorder enters the still mode automatically.

- Return code in repeat operation
  The COMPLETION code is returned when operations are completed to aborted because a target frame (time) is not found or is not present.

- Effective commands during repeat operation
  During repeat operation, the speed of playback can be altered by executing one of the playback commands listed below. These commands cannot be executed, however, during search for the start position of repeat play.
  Non playback commands such as STATUS INQ etc. can also be executed during repeat play.

  F/R PLAY
  F/R FAST
  F/R SCAN
  F/R SLOW
  F/R STEP
  STOP
  STILL

- The playback mode of F/R-FAST, F/R-SLOW, F/R-STEP or R-PLAY cannot be specified when the CLV disc is inserted.

SEARCH (43H) - Locate target address

FUNCTIION Search for specified location on disc.

DESCRIPTION The SEARCH command prompts the recorder to locate a particular position on the disc. The target address is either a frame No. or time code specified by a numerical input command. The ENTER (40H) command should be sent after the target address parameter.
If the recorder is not in the mode in which search is to be executed, send the appropriate mode command after parameter input.

Frame number mode : 55H
Time code mode : B8H

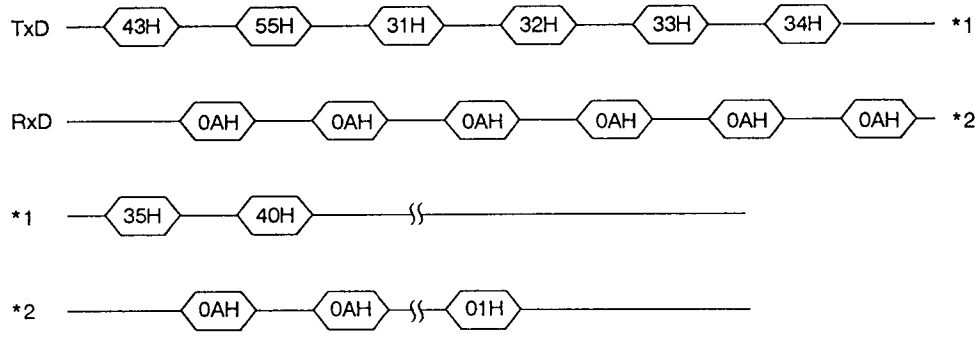
When the SEARCH command is received, the recorder will display the nearest frame in still mode.
When search is completed, the recorder sends back a return code of COMPLETION, NOT TARGET, or NO FRAME NUMBER, and enters still mode.

Results of search operation

- The COMPLETION (01H) code is returned when the target address (frame or time) is located.
- When an illegal frame is searched for, the recorder enters still mode at the end of the picture area of the disc, and the NO FRAME NUMBER (06H) code is fed back.
- During the search operation, the address data recorded during the V blanking period is read out. If the disc is flawed, or is dirty, it may not be possible to read out the address data. In this case, the recorder sends back the NOT TARGET (05H) code instead of the COMPLETION (01H) code. If the NOT TARGET code is returned several times, we recommend that you search tracks before or after the selected area.

ABORT Send the C.L. (56H) command to stop a search operation.

SAMPLE To search frame number 12345

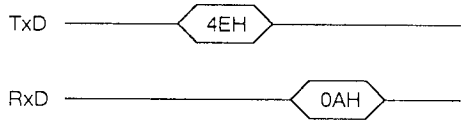


STILL (4FH) - Still picture

FUNCTION Plays back a still image.

DESCRIPTION When this command is sent, the recorder plays back a recorded picture on the disc in still mode.

SAMPLE

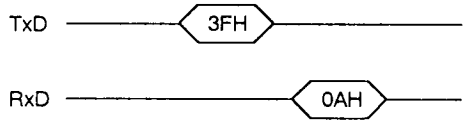


STOP (3FH) - Video and audio playback muting

FUNCTION To stop disc playback, and release the chucking of the disc.

DESCRIPTION When the recorder receives this command, it stops the current processing command and releases the chucking.
When the power is turned off without ejecting the disc, this command must be issued to prevent a disc from warping.
When the disc is not inserted or the eject process is executing, the recorder returns NAK (0BH) command.

SAMPLE To stop playback

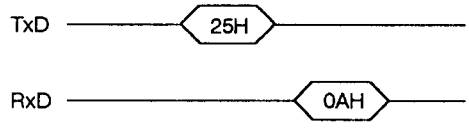


AUDIO MUTE OFF (25H) - Cancel audio mute
AUDIO MUTE ON (24H) - Mute audio output

FUNCTION Switches ON/OFF audio signal muting in the normal forward playback mode.

DESCRIPTION When AUDIO MUTE ON is input, the audio signal is muted in the normal forward playback mode. AUDIO MUTE ON is selected automatically after power on.
When the AUDIO MUTE OFF is input or power is turned off, the audio mute mode is canceled.
AUDIO MUTE ON/OFF is effective simultaneously for both left and right channels of the processor. Audio mute cannot be effected for one channel only.

SAMPLE To cancel audio mute :

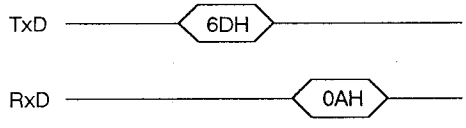


DISC (6DH) - Output of disc's playback vidio and audio signals

FUNCTION — Selects output of the playback video and audio signals from disc.

DESCRIPTION — This command selects as the output of the video and audio signals currently being played back.
During onset of playback or during fade out, the input EE signal is output.

SAMPLE — To select output from disc



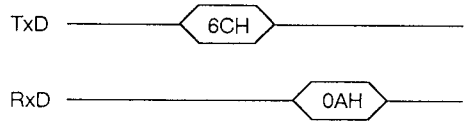
NOTES — ACK is returned if the DISC command is sent during onset of play, during fade out, execution of the STOP command or when no disc is loaded, but the output signal is not switched to the disc's output.

LINE (6CH) - Video and audio output from LINE input

FUNCTION Selects video and audio signals for output from LINE input.

DESCRIPTION This command sets the audio and video signals input via the LINE IN terminal as the output signal.

SAMPLE To output signals input via the LINE IN terminal



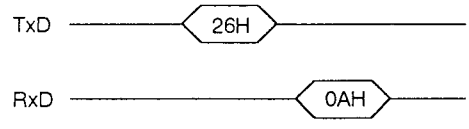
VIDEO ON (27H) - Video signal output within effective picture area
VIDEO OFF (26H) - Mute video signal output

FUNCTION Activates and deactivates video signal muting.

DESCRIPTION When VIDEO OFF is input, the video signal output is muted in all modes.
When the disc is played back in normal mode at this time, only the audio signal is output.
To cancel VIDEO OFF, either execute VIDEO ON or turn the power OFF.

NOTES LINE input cannot be muted.

SAMPLE To mute video signal output :



C.L. (56H) - ALL clear

FUNCTION Clears the mode currently selected.

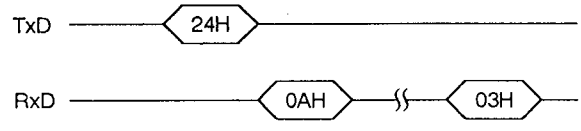
DESCRIPTION When this command is sent, the operation currently being executed is canceled, and the recorder resumes its initial mode. At this time, if a disc is inserted, the recorder enters still mode.
This command is executed in priority of all others, except in the following modes.
1. While recording a frame.

EJECT (2AH) - Eject disc

FUNCTION Ejects the disc from the recorder.

DESCRIPTION When this command is sent, the current mode of the recorder is terminated, the disc is ejected, and LID OPEN (03H) is returned.
When this command is sent, if the recorder's motor is rotating, the motor is stopped first before the disc is ejected.
If a disc has not been inserted in the recorder, and this command is input, the recorder sends back NAK (0BH).

SAMPLE



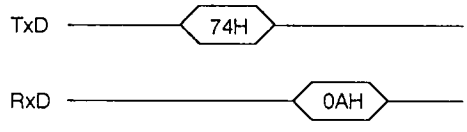
EJECT ENABLE (74H) - Activate EJECT button
EJECT DISABLE (75H) - Deactivate EJECT button

FUNCTION Activates/deactivates the EJECT button on the recorder's front panel.

DESCRIPTION When the EJECT ENABLE command is input, the EJECT button on the recorder's front panel becomes active.
EJECT ENABLE is selected automatically after power ON.

When the EJECT DISABLE command is input, the EJECT button on the recorder's front panel becomes deactivated.
To cancel EJECT DISABLE, either execute EJECT ENABLE or switch the power OFF.

SAMPLE To enter EJECT ENABLE mode



FRAME # MODE (55H) - Set to frame number mode

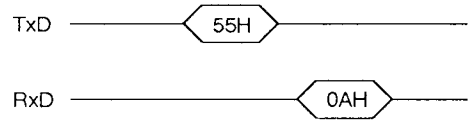
FUNCTION Sets the current position on the disc as a frame number.

DESCRIPTION When the recorder receives this comand, the following are carried out based on the frame number.

1. The IN point, OUT point and DUR specifications for the recording area.
2. Monitor TV display when the index is ON
3. Search point, repeat point and mark point specifications.

The frame number mode is selected automatically after power ON.

SAMPLE



Nak is returned if RO disc is inserted.
Search point, repeat point and markpoint can be set only by timecode.
However, the return data for ADDR INQ command is frame number same as that of WO disc.

TIME CODE MODE (B8H) - Set to time code mode

FUNCTION

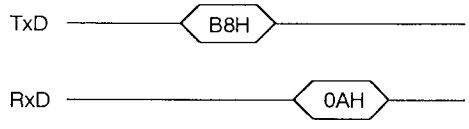
Sets the current position on the disc as a time code.

DESCRIPTION

When the recorder receives this command, the following are carried out based on the time code.

1. The IN point, OUT point and DUR specifications for the recording area.
2. TV monitor display when the index is ON.
3. Search point, repeat point and mark point specifications.

SAMPLE



NOTE

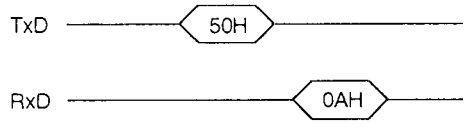
- Even when set to time code mode, the data for ADDR INQ, CURRENT BLANK INQ, NEXT BLANK INQ, and PREVIOUS BLANK INQ. are returned as frame numbers.
- The recorder is set to frame number mode automatically after power on.

INDEX ON (50H) - Activate index display
INDEX OFF (51H) - Deactivate index display

FUNCTION Activates/deactivates the index display.

DESCRIPTION When INDEX ON is input, the recorder's operation mode and disc address during playback are displayed on the TV monitor. Input sequence is also displayed simultaneously during search and repeat operations.
When INDEX OFF is input, the index display is cleared from the monitor.
INDEX OFF is selected automatically after power ON.

SAMPLE To activate the index display

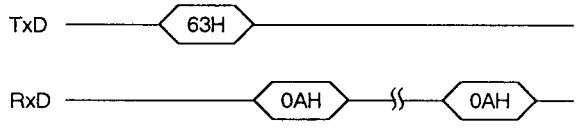


MOTOR ON (62H) - Start the motor of a recorder
MOTOR OFF (63H) - Stop the motor of a recorder

FUNCTION Controls the motor of a recorder.

DESCRIPTION When these commands are sent, the recorder returns ACK code twice.
The MOTOR ON command starts the motor of a recorder that was stopped by the MOTOR OFF command. This command is effective only when the motor is completely stopped. After the recorder receives the MOTOR ON command, it returns the first ACK code and adjusts its motor rotation to the nominal speed. After initializing, the recorder is ready for playbadk and returns the second ACK code.
The MOTOR OFF command stops the motor of the recorder and returns the laser pick-up to the home position. The video/audio information will be played back from a unit which is connected to the auxiliary input.
This command is effective only when the recorder is playing back.
After the recorder receives the MOTOR OFF command, it returns the first ACK code and stops its motor. When the motor stops completely, the motor off status bit will be on and the recorder will return the second ACK code.
However, the disc stays chucked.

SAMPLE To stop a motor when it is on



NOTES The recorder will return NAK code when :

- Receives the MOTOR ON command and receives it again before returning the second ACK code.
- Receives the MOTOR OFF command and receives it again before returning the second ACK code.
- Receives the MOTOR ON command when the motor is on.
- Receives the MOTOR OFF command when the motor is off.

ACK (0AH) - Effective command received

FUNCTION

Commands that the received command is effective.

DESCRIPTION

When the recorder receives an effective command, and is ready for input of the next command, ACK (0AH) is returned. After sending ACK, the pertinent operation is executed.
For details, see 1-1. Communication via the RS-232C interface, "1-1-3. Communication protocol".

NOTES

ACK is a feedback code returned from the videodisc recorder. It is not an executable command.

COMPLETION (01H) - Complete a specified operation

FUNCTION

Notifies that an operation has been completed.

DESCRIPTION

COMPLETION (01H) is returned to the computer when the operations listed below have been completed perfectly.

1. SEARCH (43H)
2. REPEAT (44H)
3. REC STANDBY (E0H)
4. REC (E9H)
5. EDGE RIGHT (B9H)
6. EDGE LEFT (BAH)
7. BLANK AREA SEARCH (BBH)

See NOT TARGET (05H) and NO FRAME NUMBER (06H) for associated return code.

NOTES

COMPLETION is a feedback code returned from the videodisc recorder. It is not an executable command.

ERROR (02H) - Error condition raised

FUNCTION — Notifies of a communication error.

DESCRIPTION — This code is returned in the event of an RS-232C communication error (parity error, framing error or overrun error).
If the same error is repeated, it may be assumed that the computer and recorder do not have the same baud rate setting.

NOTES — ERROR is a feedback code returned from the videodisc recorder.
It is not an executable command.

LID OPEN (03H) - Detection of disc ejection

FUNCTION — Notifies of disc eject.

DESCRIPTION — This return code is sent back to the computer when the recorder motor stops, and the disc is ejected.

NOTES — LID OPEN is a feedback code returned from the videodisc recorder.
It is not an executable command.

MARK RETURN (07H) - Detection of mark set location

FUNCTION — Notifies that the mark set location has been read.

DESCRIPTION — In mark set mode, the recorder returns MARK RETURN on reading the mark set location. When the marked position is to the outside of the position when the command was sent, the MARK RETURN code is fed back when the current location becomes either the same as or greater than the marked position. If the marked location is to the inside of the position when the command was sent, the MARK RETURN code is fed back when the current location becomes either the same as or less than the marked position.

Once MARK RETURN is transmitted, the mard set mode is canceled. Therefore, MARD RETURN will not be sent back, even if the possition is passed again, until MARK SET is revised. Furthermore, if the C.L. command (56H) is input before MARK RETURN is sent back, mark set mode is canceled.

NOTES — MARK RETURN is a feedback code returned from the videodisc recorder. It is not an executable command.

NAK (0BH) - Command execution impossible

FUNCTION — Notifies that the received command cannot be executed.

DESCRIPTION — This code is returned when it is impossible to execute the received command. In effect the code is a reminder to check the command contents, and re-send the correct command itself, or the command with the correct timing.

NOTES — NAK (0BH) is a feedback code returned from the videodisc recorder. It is not an executable command.

NO FRAME NUMBER (06H) - Target frame illegal

FUNCTION Notifies that the target frame is illegal.

DESCRIPTION The NO FRAME NUMBER code is returned in any of the following cases.

1. If the frame being searched does not exist.
2. If there are no blank areas on the disc when the REC STANDBY command is executed.

NOTES

- NO FRAME NUMBER is a feedback code returned from the videodisc recorder. It is not an executable command.

NOT TARGET (05H) - Target frame not found

FUNCTION

Notifies that access to a specified frame or data is not possible.

DESCRIPTION

NOT TARGET is returned in place of COMPLETION (01H) in the following cases.

1. Frame being searched is not found.
2. Start of blank area cannot be searched during blank area search in the recording standby mode.
3. Blank area search cannot be performed throughout the disc with the BLANK AREA SEARCH command.
4. Recording was not executed up to the OUT point.
5. Searching for the top of the next blank area by the EDGE RIGHT, EDGE LEFT command was not executed.

   The above conditions may be due to the following causes.

   - Flaws in the disc itself
   - Inordinate amount dust in the recorder's optical system
   - Focus or tracking mechanism is badly adjusted
   - Communications error

NOTES

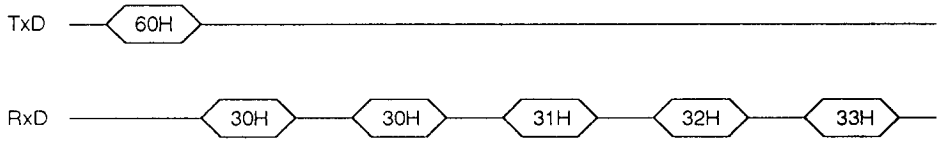
● NOT TARGET is a feedback code returned from the videodisc recorder. It is not an executable command.

ADDR INQ (60H) - Current address inquiry

FUNCTION — Requests that the recorder return the current location address.

DESCRIPTION — When this command is sent, the current address is returned as a frame number irrespective of the whether the recorder is in frame number mode or time code mode.
The frame number is represented as 5 bytes of ASCII code. The 1st byte is the MSD (Most Significant Digit), and the 5th byte is the LSD (Least Significant Digit).

SAMPLE — When the current frame is 00123



NOTES

- If a disc has not been inserted when the recorder receives this command, NAK (0BH) is returned.
- When the recorder receives this command, it cannot accept another command until the address is returned.
- The timdecode is converted to the frame number and returned for the RO disc.

CURRENT BLANK INQ (BCH) - Request for the start and end points of the currently selected blank area

FUNCTION

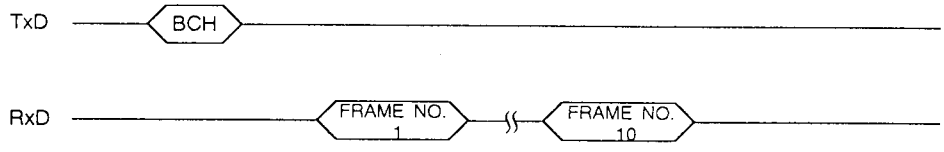
Requests that the recorder return the IN point and OUT point of the currently selected blank area.

DESCRIPTION

When this command is sent, the recorder feeds back 2 numbers consisting of 5 digits each (total : 10 bytes) from the first digits of the IN point in sequence to the last digits of the OUT point for the current pickup location. As the pickup is not shifted during CURRENT BLANK INQ, blank area data can be obtained at high speed.

SAMPLE

Rquest for data of the blank area nearest to the current pickup location.



NOTES

- If a blank area search has not been executed, NAK (0BH) is returned when the CURRENT BLANK INQ. command is input.
- If there is no blank area on the disc, 10 bytes of "0" (30H) are returned.
- NAK is returned if the RO disc is inserted.

NEXT BLANK INQ. (BDH) - Request for start and end locations of the next blank area

FUNCTION

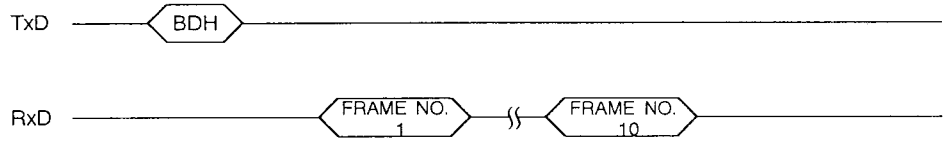
Requests that the recorder return the start and end locations of the next available blank area.

DESCRIPTION

When this command is sent, the recorder feeds back data of the blank area next to the one whose data is returned for the previous blank data inquiry command in the direction of the periphery.
10 bytes of data are sent back corresponding to two 5 digit numbers from the start position in sequence to the end position. As the pickup is not shifted with the NEXT BLANK INQ, command, blank area data can be obtained at high speed.

SAMPLE

Request for data of the next area :



NOTES

- If the NEXT BLANK INQ. command is sent after the pickup has reached the disc periphery, data is returned from the nearest blank area to the innermost point on the disc towards the periphery.
- If the BLANK AREA SEARCH command has not been executed, NAK (0BH) is returned when the NEXT BLANK INQ. command is sent.
- If the NEXT BLANK INQ. command is input without a CURRENT BLANK INQ., it is uncertain from which area the data was returned.
- NAK is returned if the RO disc is inserted.

PREVIOUS BLANK INQ (BEH) - Request for start and end point of the previous blank area

FUNCTION

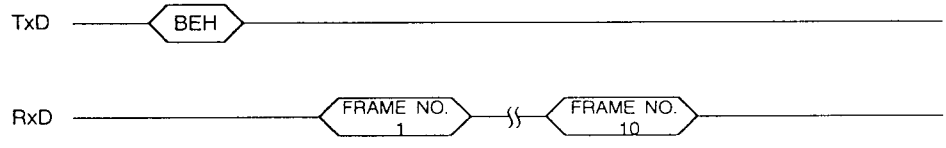
Requests that the recorder return the IN point and OUT point data for the previous blank area.

DESCRIPTION

When this command is sent, the recorder feeds back data of the blank area next to the one whose data is returned for the previous blank data inquiry command in the direction of the disc center. 10 bytes of data are sent back corresponding to two 5 digit numbers from the start position in sequence to the end position.
As the pickup is not shifted with the PREVIOUS BLANK INQ. command, blank area data can be obtained at high speed.

SAMPLE

Request for data of the previous blank area :



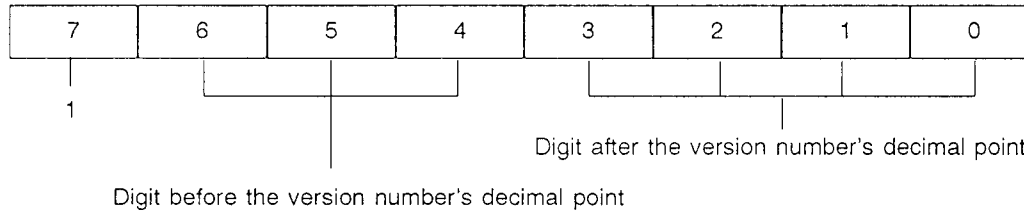
NOTES

- If the PREVIOUS BLANK INQ. command is sent after the pickup has reached the disc center, data is returned from the nearest blank area to the outermost point on the disc in the direction of the center.
- If the BLANK AREA SEARCH command has not been executed, NAK (0BH) is returned when the PREVIOUS BLANK INQ. command is sent.
- If the PREVIOUS BLANK INQ. command is input without a CURRENT BLANK INQ, it is uncertain from which area the data was returned.
- NAK is returned if the RO disc is inserted.

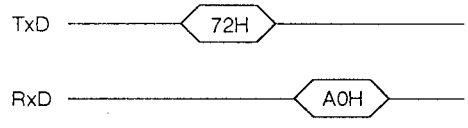
ROM VERSION INQ (72H) - Request for ROM version

FUNCTION Requests that the recorder gives notification of the ROM version.

DESCRIPTION When this command is sent, the recorder feeds back the built-in ROM version number as 1 byte of data.
Data contents are shown below.



SAMPLE In the case of Version No. 2.0



STATUS INQ (67H) - Request for recorder's operating status

FUNCTION

Requests that the recorder send back notification of current operating status.

DESCRIPTION

When this command is sent, 5 bytes of data on the recorder's current operating status (STATUS DATA) are returned.
This command can be sent at any time, as long as the recorder is on standby to receive a command.
See "Bit allocation of each byte of status data" on the following pages for data contents.

NOTES

When the recorder receives this command, it cannot accept another command until the whole status data has been returned. Make sure that the data has been returned before executing another command.

Bit allocation of each byte of status data

1st BYTE

D7 : Always "1"

D6 : Search/repeat mode flag

1 = recorder conducting search or repeat operation

D5 : Motor off mode flag

1 = recorder is in motor off mode

D4 : INIT flag

1 = recorder is in initialize mode

D3 : DISC PROP

1 = motor has stopped and disc clamp released

D2 : NO DISC flag

Always 0

D1 : FOCUS OUT flag

1 = laser pickup focus is out

D0 : ERROR

1 = erroneous command has been received

2nd BYTE

D7 : SPINDLE UNLOCK flag

1 = spindle motor servo is unlocked

D6 : CURRENT FRAME IS BLANK flag

1 = current pickup possition is in a blank frame

D5 : BLANK AREA SEARCH BUSY flag

1 = recorder is currently conducting a blank area search

D4 : REC BUSY flag

1 = recorder is currently recording

D3 : Always "0"

D2 : REC STANDBY flag

recorder is currently recording standby mode

D1 :
D0 : } Always "0"

3rd BYTE

D7 : Always "0"
D6 : DISC TYPE 2
1 = RO disc, 0 = WO disc
D5 : DISC TYPE 1
1 = CLV disc, 0 = CAV disc
D4 : DISC SIZE (Always "1")
D3 :
D2 : } Always "0"
D1 :
D0 :

4th BYTE

D7 : STEP NUMBER INPUT
1 = recorder is waiting for numerical input specifying the step speed
D6 : Always "0"
D5 : INPUT NUMBER OF REPEATS
1 = recorder is waiting for input of the number of repeats
D4 : REC FRAME
1 = Recorder is waiting for numerical input specifying the period of the recording.
D3 : REC START
1 = Recorder is waiting for numerical input specifying the initial point of the recording.
D2 : REPEAT MODE
1 = REPEAT command has been received. This setting is maintained during repeat data input. At the start of playback, the flag becomes 0". See 1st BYTE, bit D6.
D1 : SEARCH MODE
1 = SEARCH command has been received. This setting is maintained during search data input. At the start of playback, the flag becomes 0". See 1st BYTE, bit D6.
D0 : Numerical input
1 = recorder is waiting for numerical input on IN point, OUT point, DUR, SEARCH, RETEAT, STEP, MARK SET operations.

5th BYTE

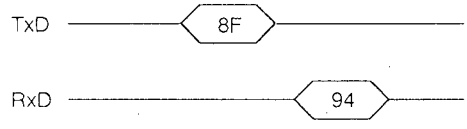
D7 : Direction of PLAY
1 = Reverse PLAY, 0 = Normal play
D6 : 1 = STOP
D5 : 1 = STILL PLAY
D4 : 1 = SCAN
D3 : 1 = STEP
D2 : 1 = SLOW
D1 : 1 = FAST PLAY
D0 : 1 = NORMAL PLAY

DEVICE TYPE REQUEST (8FH) - Request recorder category code

FUNCTION Requests that the recorder returns its category code.

DESCRIPTION Upon receiving this command, the recorder returns a code (category code) indicating its types.

SAMPLE HDL-5800 :



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HDL-5800 COMMAND

	0	1	2	3	4	5	6	7
0				0	ENTER	INDEX ON	ADDR INQ	
1	COMPLE-TION			1	C.E.	INDEX OFF	CONTI-NUE	
2	ERROR			2	MENU		MOTOR ON	ROM VERSION INQ
3	LID OPEN			3	SEARCH		MOTOR OFF	MARK SET
4			AUDIO MUTE ON	4	PEPEAT			EJECT ENABLE
5	NOT TARGET		AUDIO MUTE OFF	5		FRAME # MODE		EJECT DISABLE
6	NO FRAME NUMBER		VIDEO OFF	6		C.L.		
7	MARK RETURN		VIDEO ON	7			STATUS INQ	
8				8				
9				9				
A	ACK		EJECT	F-PLAY	R-PLAY	MEMORY		
B	NAK		FWD-STEP AND STILL	F-FAST	R-FAST	M-SEARCH		
C			REV-STEP AND STILL	F-SLOW	R-SLOW		LINE	
D				F-STEP	R-STEP		DISC	
E				F-SCAN	R-SCAN			
F				STOP	STILL			

represents return codes

- Although these commands are interchangeable with those of the Sony LDP series of laser disc players for professional use, commands which are not supported are left blank in the above list. The ACK code is returned when those blank commands for the LDP series (mode setting etc.) are sent to the HDL series recorder.

	8	9	A	B	C	D	E	F
0		FREEZE ON					REC STANDBY	
1		REEZE OFF						
2								
3								
4								
5								
6							FRAME REC	
7							CONTINUE REC	
8				TIME CODE MODE			ASSEMBLE REC	
9				EDGE RIGHT			REC	
A				EDGE LEFT				
B				BLANK AREA SEARCH				
C				CURRENT BLANK INQ				
D				NEXT BLANK INQ				
E				PREVIOUS BLANK INQ			BLANK SEARCH ENABLE	
F	DEVICE TYPE REQUEST						BLANK SEARCH DISABLE	

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